III.—*The Study and Classification of Medieval Mappae Mundi.* *By* MICHAEL C. ANDREWS, *Esq., M.R.I.A.*

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WE all know what maps are. Most of us have occasion to use them frequently. Many of us, no doubt, have spent pleasant hours in our studies, performing, with their help, what have been called 'armchair travels'. But only a few have been led to inquire into the history of maps and mapmaking, and fewer still have interested themselves in that period of the history of cartography which is the subject of this paper—the medieval period.

Interesting as it may be, it is not proposed to consider here, at any length, the development of the modern map, but to examine a chapter—and a very long chapter—in the history of cartography which, although it lasted from the third or fourth century of the Christian era till the fourteenth or fifteenth—over one thousand years—yet did not in any way tend to progress or development, and, being closed, has left no mark upon the modern map. It will, however, be necessary to give a brief outline of this development in order that the position of medieval *mappae mundi* may be clearly understood.

We know from various references in the works of the ancients that maps were in use from very early times, but of these maps, which were probably only of a local type, we have little definite knowledge. The earliest remaining example is a small circular map of late Babylonian origin, which represents in an elementary manner the Mesopotamian district. Although dating from about 500 B.C. it is thought to be based upon geographical ideas of a still earlier period.[1]

No references survive which would indicate the existence of maps of Roman construction until a comparatively late period. Indeed it has been said that the Republic conquered the world without maps, but that the Empire governed it by using them.[2] The result of an extensive survey of the provinces carried out by Agrippa in the reign of Augustus was displayed in the public porticoes of Rome in the form of a large world map. Like so many other Roman works, maps were produced by the State for public rather than for private use; indeed Suetonius has recorded that under Domitian it was a grave offence for a private person to have a map of the world in his possession.[1] Of their contents and extent we have little knowledge, but it may be inferred from the Roman genius that their maps were of a practically useful rather than of a speculatively scientific character. The unique example yet remaining, in a thirteenth-century copy, which is known as the *Tabula Peutingeriana* after its discoverer, or as the World Map of Castorius after its supposed author, is certainly of an eminently practical nature.[2] But as its sole object was to indicate the road system of the Empire, it is of such a peculiar character that it can hardly be accepted as an example of the best cartographical work of the Romans.

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[1] *Cuneiform Texts from Babylonian Tablets etc. in the British Museum*, vol. xxii, pl. XLVIII, London, 1906.

[2] M. P. Charlesworth, *Trade Routes and Commerce of the Roman Empire*, Cambridge, 1924, p. 13.

The Greeks at an early period directed their knowledge of astronomy and geometry to the measurement of the earth, which science was eventually systematized and applied in detail by the great Alexandrian astronomer Ptolemy. The work of Ptolemy has, without doubt, preserved for us all that was known of geography in the second century of our era, but the maps which illustrate his *Geography* are of much later date. Some copies were preserved in the Eastern Empire, translations of which were known to the Arabic geographers, but the earliest manuscript copies now existing date only from the latter half of the thirteenth century. It was not until Ptolemy's work was translated into Latin, in the early part of the fifteenth century, by Jacobus Angelus, and first printed in 1478, that it began to exercise that dominating influence upon the geographical ideas of the learned which continued until the age of Mercator and Ortelius. So strong was this supremacy, and so hard was it to eradicate, that Ptolemaic errors are to be found in maps even so late as the eighteenth century. That the original work of Ptolemy was furnished with maps based upon the earlier productions of the Tyrian School is hardly open to the doubt that has been cast upon it. That the maps as we now know them in manuscripts, dating from the thirteenth to the fifteenth centuries, and in the numerous printed editions, represent those originals with any degree of accuracy is more doubtful. The preservation of these maps is ascribed to a certain Agathodemon, who on very insufficient evidence has been identified with an Alexandrian of that name who flourished in the sixth century. The present form of the twenty-seven ancient maps is, however, due to Dominus Nicolaus Germanus, who about 1466 redrew them on a trapezoidal instead of on the earlier cylindrical projection. Soon after, it became the fashion, while preserving the ancient forms, to introduce modernized maps in the work of Ptolemy, many of the editions thus occupying a position analogous to our modern atlases.

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[1] Suetonius, *XII Caesares—T. Flavius Domitianus.*

[2] Konrad Miller, *Die Weltkarte des Castorius*, Ravensburg, 1888, and *Itineraria Romana*, Stuttgart, 1916.

The Ptolemaic maps are of great interest, but, notwithstanding the labours of such students as Father Josef Fischer,[1] Dr. Schütte,[2] and Dr. P. Dinse,[3] much remains to be done before they are completely intelligible. It must suffice for our present purpose to point out that they attempted to set out the known world upon scientific or astronomical principles, according to latitudes and longitudes, and that they failed to achieve complete success, not on account of a faulty method, but from a lack of sufficiently accurate data.

But another and completely different method of cartographical representation must be noticed. In the thirteenth century, or perhaps even earlier, mariners' written sailing directions were being supplemented by drawn charts. These marine maps, which are sometimes known as compass charts or loxodromic maps, but are more properly called portolan charts, were produced originally by Italian and Catalan cartographers for the use of sailors; but many of the splendid examples now known have been preserved because they were especially made for kings, princes, or patrons of the arts, and, being kept in libraries, were not subject to the deterioration and loss to which charts in use on board ship were exposed.

These charts were of a peculiarly practical character, uninfluenced by Ptolemaic or other scientific ideas. Being essentially sailing charts, they naturally were concerned almost entirely with coastal forms, with headlands and river mouths, with the adjacent islands, and with seaports. The interior of the countries shown is usually left nearly blank, except for often beautifully-executed shields, or banners, emblazoned with appropriate arms or devices. Of their origin little is known. Nordenskiöld[4] believed that what he termed the 'normal portolan' was constructed in the latter half of the thirteenth century from numerous coast sketches. Theobald Fischer[5] and Fiorini[6] would put back their first appearance to the eleventh century, and suggest a

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[1] Josef Fischer, *Verhandlungen d. XVIII. Deutschen Geographentages*, 1912; *Ptolemäus und Agathodaemon*, supplement to Hans von Mžik's translation of Muhammad ibn Mūsā's adaptation of Ptolemy, Vienna, 1916; *Ptolemäus als Kartograph*, in K. Cebrian's *Geschichte der Kartographie*, Gotha, 1923.

[2] Gudmund Schütte, *Ptolemy's Maps of Northern Europe*, Copenhagen, 1917.

[3] P. Dinse, 'Die handschriftlichen Ptolemäus-Karten und ihre Entwicklung im Zeitalter der Renaissance,' *Zentralblatt für Bibliothekswesen*, xxx, 1913; 'Die handschriftlichen Ptolemäus-Karten und die Agathodämonfrage,' *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1913.

[4] A. E. Nordenskiöld, *Periplus*, Stockholm, 1897.

[5] Theobald Fischer, *Sammlung mittelalterlicher Welt- und Seekarten italienischen Ursprungs und aus italienischen Bibliotheken und Archiven*, Venice, Ongania, 1886.

[6] Matteo Fiorini, *Le proiezioni delle carte geografiche*, Bologna, 1881.

Byzantine influence; while Dr. Stevenson[1] finds in them not only the elements of the compass charts, but those of the ancient sailing directions or *periploi* and of their medieval analogues the *portolani*.

An interesting record has been preserved of the crusade of Louis IX, which states that when, after leaving Aigues Mortes in 1270, the expedition was overtaken by a storm, the pilots brought *charts* to the king to show him their position.[2] Raymond Lull, writing in 1286, mentions charts used in navigation. The earliest portolan charts now preserved are not, however, older than the last years of the thirteenth century or the first years of the fourteenth. Even at this date, the coasts of the Mediterranean and Black Seas are drawn with that surprising accuracy which is typical of the whole group for the three centuries during which they were produced. Outside the Straits of Gibraltar, the western seaboard of Europe, the north-western coasts of Africa, and the Atlantic islands are often included, but with less accuracy and with less fixity of form, indicating clearly that these regions had not been mapped for so long a period as the Mediterranean basin. After the great discoveries of the fifteenth century the marine chart was extended in scope by the inclusion of the whole of Africa, with parts of the two Americas and eastern Asia, thus approaching more nearly to the character of a true world map.

These portolan charts were constructed by means of bearings taken from prominent physical features, and by estimated sailing distances. They were produced for practical purposes by methods which were practical but quite unscientific. The nautical cartographer had in fact stumbled upon an insoluble problem when he attempted to depict a portion of the sphere on a plane surface, preserving at the same time a correct outline and true compass bearings. That the distortion was small enough not to interfere to any great extent with practical utility was due to the restricted area dealt with and to its considerable distance from the pole; that it escaped notice was probably the result of observational methods which left much to be desired in accuracy. The use of nautical charts was, however, almost entirely confined to mariners; they were highly esteemed by pilots and navigators, but were either entirely ignored or looked upon with suspicion by those learned geographers who recognized only the authority of Ptolemy.

These, then, were two of the chief elements from which sprang the modern map—the *scientific* or Ptolemaic, and the *practical* or Marine.

In the sixteenth century, more especially in its latter half, the local mapping of kingdoms, provinces, and territories was in full swing: geographers, such as Mercator and Ortelius, and their followers, combined the work of topographers on the principles already accepted, and thus laid the foundation of the modern map, which is both *scientific* and *practical*.

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[1] E. L. Stevenson, *Portolan Charts, their Origin and Characteristics*, Hispanic Society of America, New York, 1911.

[2] Guillaume de Nangis, *Historiens de France*, tome xx, pp. 444–5.

[3] Raymond Lull, 'Fenix de as maravillas del orbe', in *Arbor Scientiae*, Lyons, 1515, fol. cxci.

To turn now to the subject-matter with which we are directly concerned, it should be noticed that the medieval map which, in the western world, filled the period between the decline of the scientific method and the rise of the practical, differed essentially from the productions of both. Medieval cartographers made no use of astronomical observations; latitudes and longitudes found no part in their scheme. Their maps were based upon pre-Ptolemaic and pre-scientific models, which had already become debased and which in their hands suffered still further distortion. Symmetry and authority were more esteemed than accuracy and truth. A taste for the fabulous produced extraordinary representations, which unintelligent copying still further confounded. Neither were these maps practical: they did not attempt to depict the world as it really was, but laid down a picture, often reduced to a mere symbol, of the geographical system described in some popular work which they were used to illustrate.

The history of ancient geography has occupied the attention of eminent scholars for many ages, but the study of medieval geography is of more recent date and of much slighter extent; while that section dealing with cartography has only received attention from a few students within the last seventy-five years, most writers on the history of geography having dealt with it very slightly or neglected it entirely. For this neglect there seem to be three reasons: medieval *mappae mundi* have no place in the development of the modern map, upon which they exercised no influence; they seldom represent the best contemporary geographical knowledge; the original material is not easily accessible, nor is there a sufficient number of accurate reproductions.

But if medieval *mappae mundi* had no influence on modern cartography, they are surely worthy of study as representatives—if often very debased representatives—of earlier world diagrams, now lost, of which we can hope to gain an idea only by the comparative examination of their derivatives. The study of medieval maps is not one which leads the mind of the student forward to modern methods and ideas, but is one which directs his inquiries backward towards the origins of cartographical representation. It is as much a subject for the antiquary and the historian as for the geographer. As Canon Bevan says in his essay upon that splendid example of medieval cartography, the Hereford map: 'Viewed in a strictly geographical aspect, as a representation of the world at the time of its execution, the map would not repay anyone for the time spent in its study. Viewed, on the other hand, as a literary monument on which is registered the position of learning towards the close of the thirteenth century, the map will be found worthy of examination.'[1]

Again, if medieval *mappae mundi* do not reflect the best geographical knowledge of their age, yet they have undoubtedly preserved for us the materials upon which the ordinary student of the period formed his ideas about the world in which he lived. These maps are to be found not in special geographical treatises, which were studied only by the few, but generally appear as illustrations in some of the more popular works of the middle ages. They are to be found in historical and in encyclopaedic works; in philosophical and semi-philosophical treatises; in chronicles, and to a lesser degree in theological disquisitions. Many of these works were copied extensively and read constantly by the medieval student, and, as graphic representations are generally more impressive than written descriptions, his geographical and cosmographical ideas must have been materially influenced by the maps and diagrams thus brought before his eyes, even should those maps and diagrams illustrate a knowledge less true and less accurate than that to be found in the more uncommon geographical texts to which he might sometimes have access. The strongest claim, therefore, for the study of medieval *mappae mundi* seems to be that from them we may hope to supplement our knowledge and correct our ideas of that category of medieval thought which was concerned with a subject at all times and in all circumstances of the highest importance to the human race—a knowledge of the world.

The greatest obstacle to the study of medieval maps is, however, the lack of a sufficient quantity of published facsimiles. Isolated examples had indeed been reproduced even as early as 1611, but they were few.[2] When in 1849 the Vicomte de Santarem[3] published the first volume of his work on medieval cosmography and cartography he enumerated only twenty-three medieval maps known by him to have been previously published, and of these only eight were complete, the remainder being merely fragments. In his great atlas, now excessively scarce, he published reproductions of 117 medieval *mappae mundi*, thus laying the foundation of their study. But though good work on a smaller scale was done about the same time by the Polish antiquary Joachim Lelewel,[4] by D'Avezac,[1] and later by such students as Heinrich Wuttke[2] and Jomard,[3] nothing approaching Santarem's work in importance appeared until about thirty years ago, when Dr. Konrad Miller, of Stuttgart, published his six slim volumes on medieval *mappae mundi*, in which he deals with some 200 examples (with seventy reproductions), and which to-day are the standard work on the subject.[4] The addition of new material was considerable, but the value of Dr. Miller's work to the student is mainly due to his thorough examination of certain of the larger maps, and to his comparative study of some of the smaller and less known groups. His work in the latter direction was, however, greatly restricted by the relatively few examples of each type which were known to him.

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[1] W. L. Bevan and H. W. Phillott, *Mediaeval Geography: an Essay in illustration of the Hereford Mappa Mundi*, London and Hereford, 1873, p. 2.

[2] Bongars, *Gesta Dei per Francos*, tome ii, 1611.

[3] Le Vicomte de Santarem, *Essai sur l'Histoire de la Cosmographie et de la Cartographie pendant le Moyen-Âge*, 3 vols., Paris, 1849, 1850, 1852, and Atlas published in separate sheets at various dates.

[4] Joachim Lelewel, *Géographie du Moyen Âge*, 4 vols., Breslau, 1852; *Épilogue*, Bruxelles, 1857; and Atlas, Breslau, 1851.

A search for further examples soon made it evident that a rich and almost unexplored field was open to the student. The systematic examination of many manuscripts, in libraries both at home and on the Continent, has resulted in the accumulation of a collection of about 600 examples of medieval *mappae mundi*, ranging in date from the eighth to the fifteenth century. Although only a small proportion of these are of a large size or of elaborate execution, even the smaller, more elementary and symbolic designs are of considerable interest. It is to be hoped that at some future time it may be found possible to publish these examples in facsimile, in order to provide material for a more extended and more systematic study of the subject.

But no collection, however extensive, can yield its full value if each example is regarded as a separate individual. We must study our material comparatively; we must group our examples and attempt to classify them; and although, in this case, classification will not disclose any constant improvement, either in contents or in execution, but rather debasement, deterioration, and a growing tendency towards symbolic and diagrammatic treatment, yet we may hope by its means to ascertain the relationships existing between the various groups, and even to throw some light upon the probable derivation of the groups themselves from common ancestors.

Santarem frankly admitted that he could not classify medieval *mappae mundi* in a satisfactory manner, and fell back upon a chronological arrangement which he hoped would illustrate the historical development of cartography. His failure appears to be due to the insufficiency of his material, and to his idea that these maps should be classified according to schools of geographical thought, a method which proved impracticable on account of the difficulty of determining their predominant geographical characteristics. For him the theological element was the only one to be clearly traced, and as, according to his view, it exercised its influence on all medieval maps, it was rendered useless as a means of classification. Lelewel and after him Philippi[1] seem to lean towards a classification by means of external form, although they attempted nothing definite in this direction. Maps, however, which are circular or square, oblong or oval, may belong not only to the same family but to the same species, and even to the same variety of that species; while the contents of those which agree in taking the most common circular form often differ fundamentally both in extent and arrangement. Miller, although examining very carefully and with great skill the relationships existing between the individuals in some of the groups with which he deals, has not attempted to lay down any general classification for these groups.

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[1] D'Avezac. Many studies and notices, a bibliography of which, amounting to ninety-seven items, is to be found in his *Le Ravennate et son exposé cosmographique*, published after his death by Jean Gravier, Rouen, 1888.

[2] Heinrich Wuttke, 'Ueber Erdkunde und Karten des Mittelalters,' in *Serapeum*, nos. 15, 16, 17, and 18, Leipzig, 1853.

[3] E. F. Jomard, *Les monuments de la géographie; ou, recueil d'anciennes cartes européennes et orientales*, Paris [1842–62].

[4] Konrad Miller, *Mappaemundi, die ältesten Weltkarten*, 6 vols., Stuttgart, 1895, 1896, 1898.

Unfortunately, in our present state of knowledge concerning medieval cartography, any classification must necessarily be provisional and tentative; but the most satisfactory method appears to be one based upon the internal form and contents, and it is upon this principle that I have attempted to construct a scheme. In dealing with materials of the present nature, it is hardly to be expected that any grouping could have a scientific accuracy, or that it could comply strictly with the essentials of systematic classification. For example, it will be noticed that, although the classification into families, divisions, and genera is based upon general considerations of internal form and contents, yet the various species of maps to be found in each are arranged according to the manuscripts in which they are commonly to be found. It may be urged with some truth that this is a departure from the strict principle of classification; but such departure will be seen to be more apparent than real when it is realized how closely, in general, the maps illustrating the manuscripts of any author conform to one type. It is, however, hoped that the scheme here indicated in outline may approach nearly enough to the ideal to be of some assistance to a comparative study of the somewhat confused mass of material comprised under the term medieval *mappae mundi*.

In the numerous examples of medieval world representations now brought to light we find clear evidence of two very different conceptions of our earth. One is due to the early and simple idea of a small and inhabited flat disc; the other to the later and more scientific realization of a large sphere, of which only

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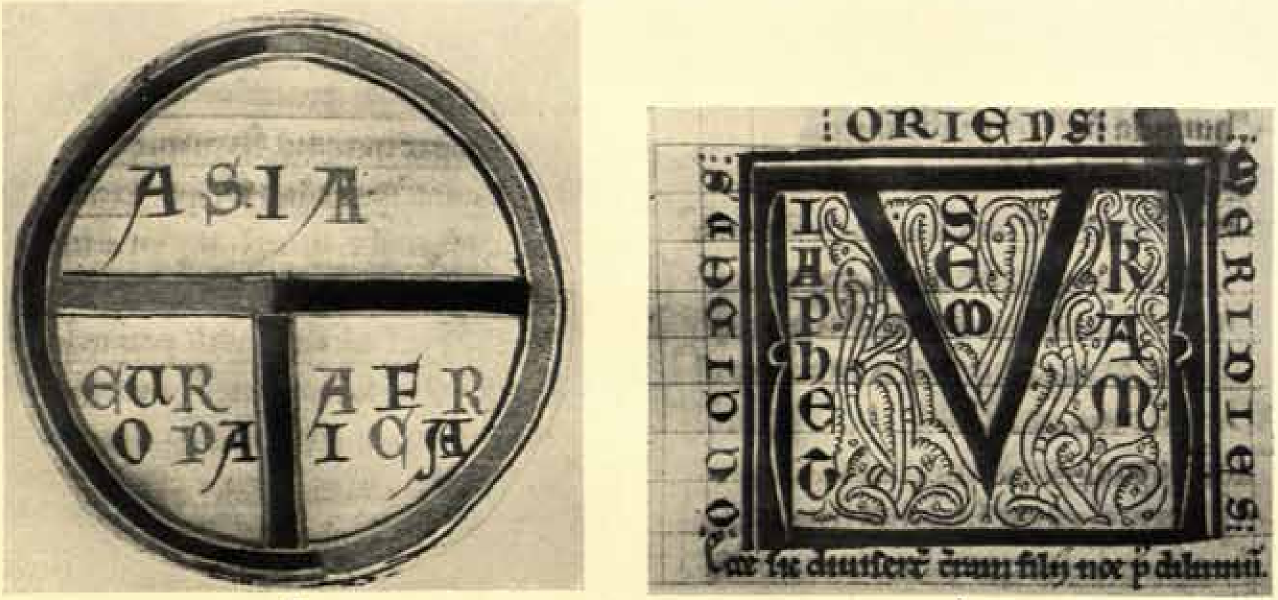
[1] F. Philippi, *Zur Reconstruction der Weltkarte des Agrippa*, Marburg, 1880.



a *b*

Fig. 1. Oecumenical-Tripartite. *a.* T–O: *b.* □–V. Isidore, *Etymologium*: Rouen, Bibl. de la Ville, Cod. 1019. 13th cent.

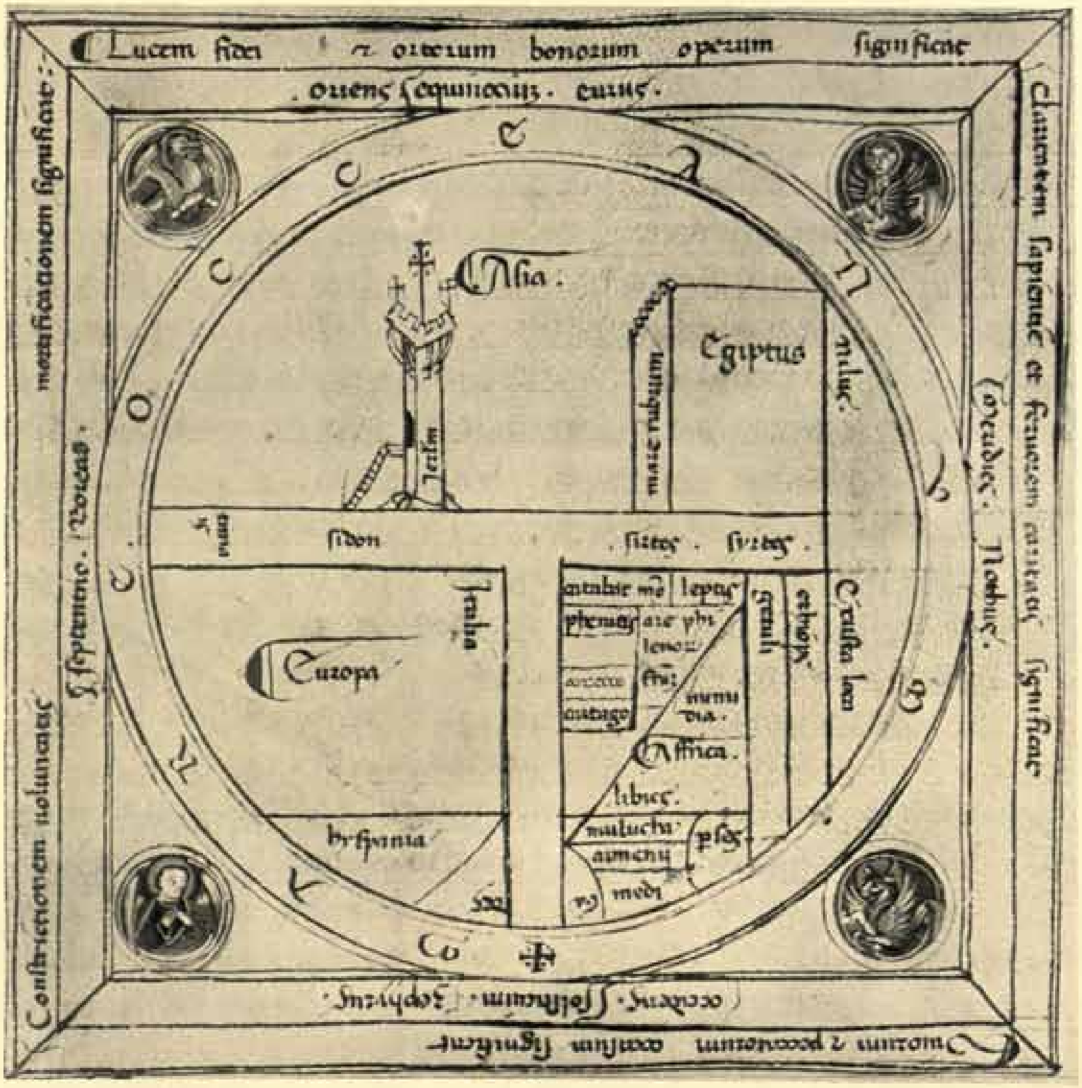

Lucem fidei & ortum bonorum operum significat
oriens equinoctialis. eurus.
Claritatem sapientie et feruorem caritatis significat
meridies. Nothus.
Constrictionem uoluntatis mortificationem significat
septemtrio. boreas.
occidens solsticialis. zephirus.
Asia
Ierlm
mare rubrum
Egiptus
Nilus
Sidon
Europa
Italia
hyspania
Affrica
libies
Ethiopia

Fig. 2. Oecumenical-Tripartite T–O.
Sallust, *Bellum Jugurthinum*: Venezia, Bibl. di San Marco,
Fond. Ant. Lat. 432. 14th cent.

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a small part was known. Medieval *mappae mundi* may, therefore, be divided into two great families. First, those which seek to represent only the habitable world—the *Oikoumene* of the Greeks, the *Terra Habitabilis* of the Romans. This family may be called *Oecumenical*. The second family embraces those maps which represent the whole hemisphere and may be called *Hemispherical*.

The design of the OECUMENICAL FAMILY is based upon the elementary idea of a plane earth extending round the observer in all directions, the result being a view of the known world such as might be obtained from a high mountain top. It is probably due to an extension to the whole world of the simple methods of local cartography common to the earliest inquiries of most ancient peoples, before the development of the mathematical and astronomical sciences. Avoiding as it did the awkward controversial question of the antipodean races of the human kind, and lending itself readily to the exposition of certain biblical traditions such as 'the circuit of the world', and to the later ecclesiastical theory which placed Jerusalem at its centre, it received the approval of the early Fathers of the Church, and was naturally and freely adopted by medieval monastic scribes, even long after the sphericity of the earth had been generally accepted. The family may be grouped into two divisions. The first, containing those maps which indicate the widely accepted partition of the habitable world into three parts, Europe, Asia, and Africa, by the three sons of Noah, is called the *Tripartite* division; other maps which do not indicate any continental boundaries are grouped under a second *Simple* or *Non-Tripartite* division.

The TRIPARTITE DIVISION includes maps which indicate the boundaries of the three continents of the ancient world in different ways.

Genus (1). The most generally adopted partition is by means of a T within an O, maps so constructed being named T–O maps, or by some continental writers O–T maps (indicating the words *Orbis Terrarum*) or wheel maps (from the likeness to a wheel-rim and its spokes). In these maps the outer circle represents the 'River of Ocean', the lower limb of the T the Mediterranean Sea dividing Europe from Africa, and the upper or cross stroke the rivers Tanais and Nilus, dividing respectively Europe and Africa from Asia, which thus occupied half the circle. The numerous maps of this type, although all conforming to the general design of the genus, differ in minor details, and may be classified according to various species, such as those commonly to be found in the *Etymologium* of Isidore of Seville, which usually indicate an elementary continental division only (pl. VIII, fig. 1, *a*), or at most record the patrimony of Shem, Ham, and Japheth; in the *Bellum Jugurthinum* of Sallust, which pay particular attention to Africa as described in the text (pl. VIII, fig. 2); in the cosmographical poem of Gauthier of Metz and in other works.

Genus (2). The division of the habitable world may be effected by radii springing from the centre of the circle in the form of a Y (pl. IX, fig. 1). This type is not common.

Genus (3). The world may be given a rectangular form with a continental division in the form of a V as in some manuscripts of Isidore's *Etymologium* (pl. VIII, fig. 1, *b*).

The SIMPLE DIVISION comprises many of the earliest, most elaborate, and largest cartographical productions of the middle ages, such as the seventh-century example of Albi; the tenth-century Anglo-Saxon or Cotton Map; the great 'wall' maps of Hereford and Ebstorf, and their smaller 'book' relations; the maps to be found in the *Polychronicon* of Ranulphus Higden of Chester and in the works of Matthew Paris. None of these indicates the continental boundaries in any arbitrary way, but all follow more or less the configuration of the actual geographical features. It should, however, be noticed that in some of them the tripartite division, although not formally indicated, has evidently exercised a strong influence upon the design. As it is not possible to reproduce here any large map unless on so reduced a scale as to be illegible, the example selected to illustrate this division is a small and elementary but interesting design, showing more than common knowledge of the East (pl. IX, fig. 2). Any classification of this division into genera appears at present to be premature, but the specific differences of the various groups are clear.

The second or HEMISPHERICAL FAMILY includes those *mappae mundi* which depict the whole hemisphere, including not only the known habitable region in the north, but also the parts to the south of the equator. These regions were designated as uninhabitable, if the map-maker wished to conform with the tenets of the medieval Church, or were represented as the dwelling-place of our *Antikoi* or *Antipodes* if he had a mind more free from dogma. Some of these maps, in addition, indicate in a vague manner the possibility of continents in the other hemisphere, but no very intelligible method of representation seems to have been devised. Perhaps no map-designer was sufficiently convinced of their existence, or bold enough to defy tradition by making any more definite reference to lands which could not, according to the theologians, have been peopled by the sons of Adam. Be this as it may, the medieval maps of the hemispherical family are derived from a pre-Christian science, which recognized the sphericity of the earth. They are a debased product of the mathematical geography of former ages. The great popularity of the works of Macrobius and Martianus Capella, by whose writings this essentially anti-biblical picture of the world was introduced to students of the ninth century, is sufficient to account

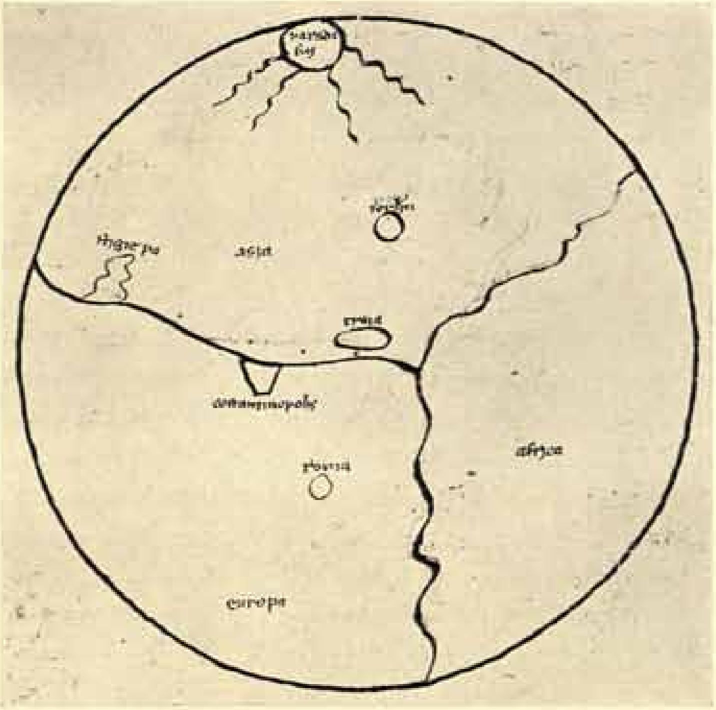

Fig. 1. Oecumenical-Tripartite Y–O
Macrobius, *Com. in Somnium Scipionis*
Paris, Bibl. nat. Cod. Lat. N.A. 16679. 11th cent.

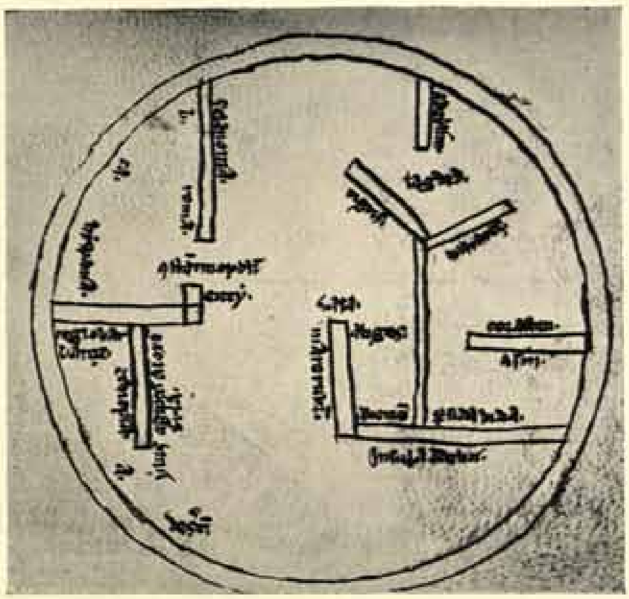

Fig. 2. Oecumenical-Simple
Commentary on Aristotle *De prop. elementorum*
Oxford Bodl. Lib. MS. Auct. F.S. 28. 13th cent.

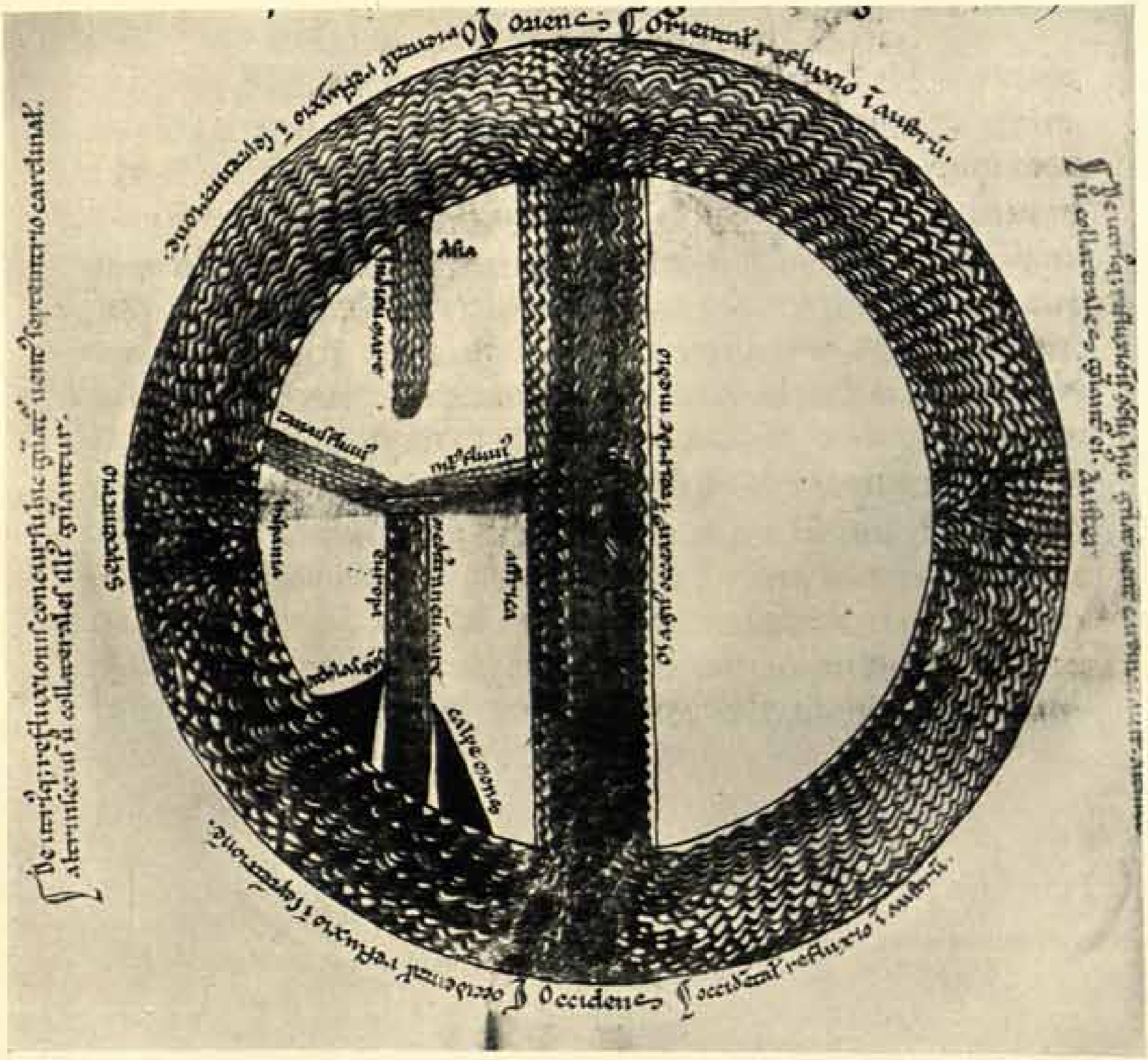

Fig. 3. Hemispherical-Oceanic-Simple
William of Conches, *Dragmaticon*. Montpellier, Bibl. de l'Université, Cod. H. 145. 13th cent.

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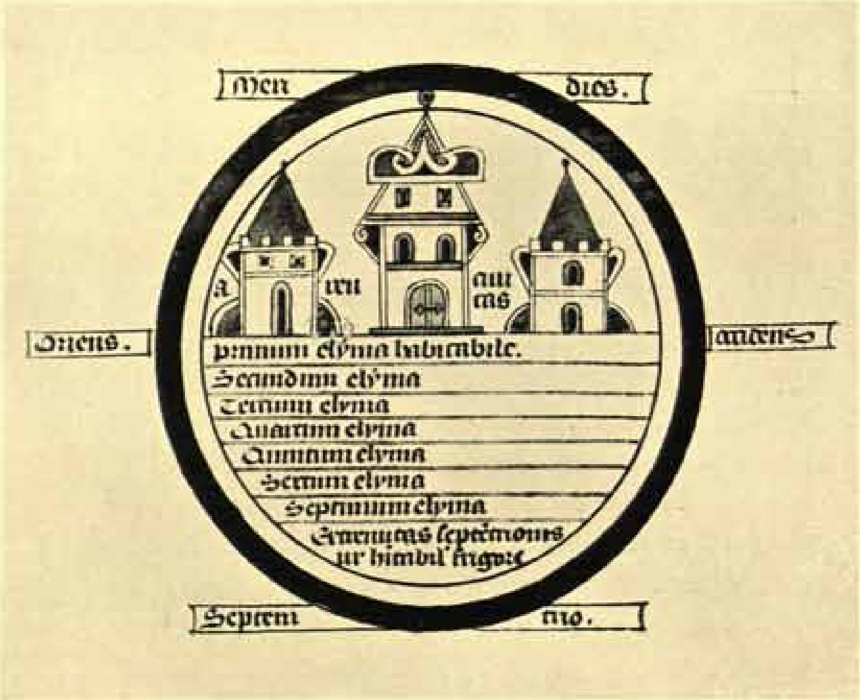

Fig. 1. Hemispherical-Nonoceanic-Climate
Petrus Alphonsus, *Dial. contra Judeos.* Oxford Bodl. Lib. MS. Laud. Misc. 356. 15th cent.

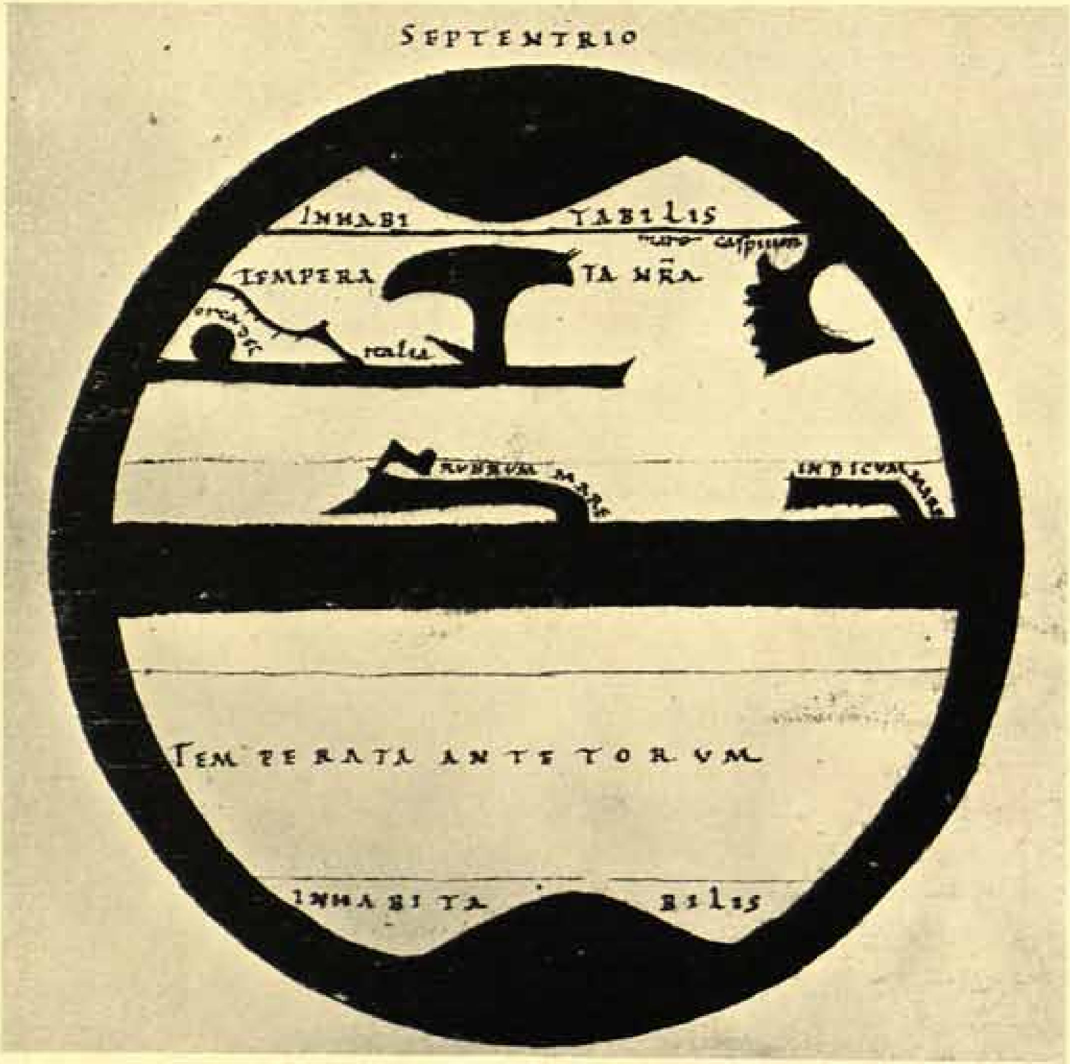

Fig. 2. Hemispherical-Oceanic-Zone
Macrobius, *Com. in Somnium Scipionis.* B.M. Harl. MS. 2772. 9th cent.

Published by the Society of Antiquaries of London, 1926

for the somewhat surprising fact that maps of this type are to be found as frequently as those of the more orthodox oecumenical design.

The majority of medieval world maps of the hemispherical type are constructed in accordance with what is known as the 'oceanic theory', attributed to Krates of Mallos, which recognized two oceanic streams. The 'true' ocean encircled the sphere equatorially, while the popularly accepted ocean which passed through the poles was regarded as subsidiary. These two streams, flowing at right angles to one another, divided the world into four equal land masses. Some groups, however, give no indication of any equatorial ocean nor in consequence of any quadripartite division.

The Family may, therefore, be divided into two main branches: the OCEANIC or QUADRIPARTITE DIVISION and the NON-OCEANIC or NON-QUADRIPARTITE DIVISION. The maps belonging to the first division, which, to judge by the numerous examples remaining to us, was by far the most popular in medieval times, may be further classified as *Simple* and *Zone*.

(1) The *Simple Genus* includes maps such as those in the *Liber Floridus* of Lambert of St. Omer and some in the works of William of Conches, which depict the whole hemisphere bisected by the equatorial ocean, but do not indicate any division by zones. The northern habitable parts in these maps are often divided in tripartite fashion, as in the example selected (pl. IX, fig. 3), but sometimes have no formal divisions.

(2) In the *Zone Genus* the hemisphere is divided into five zones; the central or torrid with its equatorial ocean, the two temperate with geographical features in the northern only, and the two frigid zones at the poles, uninhabitable on account of cold. Examples of various species are to be found mainly in the *Commentarius in Somnium Scipionis* of Macrobius, the *Philosophia* and *Dragmaticon* of William of Conches, and less frequently in other works. In the Macrobian maps, the Kratesian scheme is usually more fully illustrated by the inclusion of inscriptions dealing with the oceanic tides, which, however, are omitted in the early example selected (pl. X, fig. 2). Nevertheless, this map still retains, on a somewhat exaggerated scale, the north and south polar bays, where the waters flowing in different directions met twice daily with a great shock, and in turning back gave rise to the tidal phenomena.

Two curious forms of pseudo-zone maps are to be found in the *De Natura Rerum* of Isidore of Seville; in one, the hemisphere is divided by arcs of circles, in the other, which is highly diagrammatic and based upon a complete misconception of mathematical geography, the five zones are arranged in pentagonal form round a central flat-earth circle.

The essential difference between maps of the zone type and those in which the northern half of the hemisphere is divided into the seven climates of the Greek and Alexandrian geographers has not been sufficiently insisted upon.[1] Climate maps, however, have sufficiently well-marked characteristics and distinct origin to justify their classification, not only in a different genus, but in a different division from the maps just considered.

Although the southern boundary of the first climate does not always coincide with the equator, these maps do not, in general, show any equatorial ocean, nor, in consequence, do they indicate any quadripartite division of the globe.[2] They must, therefore, be relegated to our second NON-OCEANIC or NON-QUADRIPARTITE DIVISION.

Examples of hemispherical maps which do not conform to the oceanic theory are not nearly so numerous as those which adopt it; indeed, the existence of any other groups in this division, except the climate maps, is very questionable. In none of the zone maps, other than mere diagrams, yet brought to light, is the equatorial ocean omitted, and although in one example of a simple hemispherical map from the *Philosophia* of William of Conches no such ocean is drawn,[3] it is probable that the omission is due to a copyist's error, as in a dozen other examples of this particular variety the equatorial ocean is distinctly shown.

Climate maps are also derived from quite different sources than the zone maps. They are due to the influence of Arabic cosmographers and geographers who preserved the ancient Greek ideas about the world through those dark ages when they had been forgotten by western learning. Most Arabic maps are not only divided into climate bands, but are placed with the south uppermost; but no very early Latin examples are to be found, as this system was not generally known to students of western Europe until the medieval renaissance of the twelfth century, when Christian students, with the assistance of Spanish Moslems and Jews, translated many scientific treatises into Latin. No *mappae mundi* have been found in the works of Adelard of Bath, the earliest of these translators, nor in those of Gerard of Cremona, who was the most prolific; but examples, usually mere diagrams, are to be found in the twelfth- and thirteenth-century manuscripts of the *Dialogus contra Judeos* of Petrus Alphonsus of Huesca (Rabbi Moisè Shephardi), and in the *Sphaera* of Sacrobosco (John of Holywood), while a more elaborate, but still later, map occurs in the work of Petrus Alliacus (Cardinal Pierre d'Ailly).

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[1] Although K. Miller, *Mappaemundi*, vol. iii, has devoted a separate section (§ xv) to Climate Maps, yet he includes those to be found in Sacrobosco as no. 7 of Section xiv, Macrobius Maps; under which somewhat misleading title he groups zone maps of all types. In vol. ii of his *Dawn of Modern Geography*, 1901, pp. 573-4, Professor C. R. Beazley draws no clear distinction between climate and zone maps; neither does the Abbé Anthiaume, *Les Cartes géographiques . . . au moyen âge*, Paris, 1912, p. 24. It may also be noticed that although Miller gives eight reproductions in § xiv, ostensibly devoted to Macrobius maps, not one of these is from a *manuscript* of Macrobius, three being taken from late printed editions; neither is any one of the remaining five of true Macrobian character.

[2] One example only of a climate map with an equatorial ocean has been found in codex Cotton, Julius D. VII, fol. 46, in the British Museum. This interesting thirteenth-century map exhibits a strange mixture of Christian and Moslem geographical systems.

[3] Oxford: University College MS. VI, f. 419.

An interesting feature in the climate maps is the prominence sometimes given to the mythical world-centre *Arin*.[1] Adopted by the Arabic cosmographers from the Indian philosophers, this 'cupola of the world', which was placed on an island in the Indian Ocean, played an important role in their geographical systems. For through *Arin* passed the prime meridian of the Arabs; it was situated midway between China in the east and the Fortunate Islands in the west, and it had no longitude (pl. x, fig. 1).

Finally, it must be pointed out that some *mappae mundi*, notably the splendid series to be found in codices of the commentary on the Apocalypse by Saint Beatus of Liebana, while spreading the known habitable world over nearly the whole of their surface, yet indicate an austral continent. For, in addition to the three known parts of the world, a fourth part is shown to the south of the central ocean, which, while 'inhabited by the fabulous antipodes, is unknown to us on account of the intolerable heat of the sun'. These maps, therefore, cannot be properly assigned to either of our main families, but, partaking as they do of the characteristics of both, must be considered as occupying an intermediate position between the oecumenical and hemispherical types.

We have now examined the whole range of western medieval cartography so far as the space at our disposal permits, and so far as is possible with a limited number of examples. These examples have not been chosen on account of their individual interest, but, so far as limitations of size will allow, as representatives of the various branches of the classificatory scheme which has been briefly indicated.

Although this scheme covers fairly satisfactorily all the materials at present known, it is probable that, as further examples are discovered, it will need to be expanded and perhaps revised. I can only hope that in its present form it will not be found to be so inadequate, or so erroneous, as to prove entirely worthless as an aid to the comparative study of medieval *mappae mundi*.

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[1] M. Reinaud, *Géographie d'Aboulféda*, Paris, 1848, tome i, Introduction générale à la géographie des orientaux, p. ccxxxix et seq., and *Mémoire géographique, historique et scientifique sur l'Inde antérieurement au milieu du xi^e siècle de l'ère chrétienne*, Paris, 1849, p. 367 et seq.

CLASSIFICATION OF MEDIEVAL MAPPAE MUNDI

Family	*Division*	*Genus*	*Species*
(I) OECUMENICAL	(A) Tripartite	(1) T–O	(*a*) Isidore (*b*) Sallust (*c*) Gauthier de Metz
		(2) Y–O	
		(3) □–V	Isidore
	(B) Simple	—	(*a*) Early (*b*) Hereford-Ebstorf (*c*) Higden (*d*) Matthew Paris
INTERMEDIATE	—	—	Beatus
(II) HEMISPHERICAL	(A) Oceanic	(1) Simple	(*a*) Lambertus of St. Omer (*b*) William of Conches
		(2) Zone	(*a*) Macrobius (*b*) William of Conches
	(B) Non-Oceanic	Climate	(*a*) Petrus Alphonsus (*b*) Petrus Alliacus (*c*) Sacrobosco

Discussion

Mr. Heawood said he could only admire the industry and acumen which had enabled Mr. Andrews to increase the number of known *mappae mundi* from 200 to 600. He inquired whether the number of types increased in proportion, and whether fresh discoveries might still be looked for. Mr. Andrews appeared to use the term medieval in a somewhat restricted sense, as referring to quality rather than period. It was only fair to remember that there were other and better maps which might justly be credited to the middle ages. The eminently practical Portolani maps were medieval in their origin; then we had the famous Catalan map of 1375, which gave the results of Marco Polo's travels; the Claudius Clavus map of the early fifteenth century, which represented northern Europe with fair accuracy; whilst a Bodleian map of the thirteenth century was surprisingly correct with regard to England. Mr. Andrews doubted whether any existing maps truly represented those of Ptolemy, but Father Josef Fischer had shown reason to think they did. Pappus of Alexandria was said by Suidas to have followed Ptolemy, and was in turn followed by Moses of Chorene, so that, as the latter's descriptions tallied with the maps we knew, the succession seemed to be unbroken. The twenty-seven maps of Germanus were drawn before his time, and he merely altered the projection; moreover, Fischer regarded the versions with sixty-eight maps as still nearer the originals. He thought justice had hardly been done to the 'medieval' map-makers, whose sketches were only intended to be diagrammatic, and may have served their purpose sufficiently well: data such as sailors needed would have been wasted on literary circles. The so-called map of Columbus lately brought to light gave up-to-date information on one side and on the other a map which recalled the circular or oecumenical series of Mr. Andrews. He inquired whether the makers of the 'hemispherical' maps really considered they were showing only half of the earth's surface, and, if so, what were their ideas about the other half. It was interesting to note survivals from medieval maps in those of later date. In the seventeenth century some of Edrisi's Arabic names were still given for northern Asia, and Mercator's Greenland map gave as place-names the words of a folk-song that had been written round the coasts of an earlier map, and subsequently provided with latitudes and longitudes.

Mr. Brindley said that in such an extensive range of maps there must be some of extreme complexity, difficult to classify. The hemispherical were the most complex, and he thought some cross-classification was inevitable. Further evidence as to genus and species was desirable before a system was decided on. Whether the southern world was hot or cold, it was placed south of the middle of Africa, and sometimes separated from it by another ocean: occasionally there was more than one line of land.

Prof. Callender held that *mappae mundi* belonged rather to archaeology than to geography. The circumference and diameter of the globe had been calculated almost exactly by Eratosthenes; and the sphericity of the globe was known in ancient times. Could that knowledge have entirely disappeared? The elder Pliny spoke of misguided persons who considered the earth flat, and Pliny was in the hands of the Venerable Bede. St. Augustine's view, however, was diametrically opposite—*nulla ratione credendum est*; and Pope Zachary, in the eighth century, said that all who gave credence to the idea of a spherical earth should be excommunicated. Menaced with such anathemas, the vast majority of Christians in the middle ages conformed to the belief in a flat earth; and medieval maps crystallized that belief. The real antecedents of modern geography were, not the *mappae mundi*, but the sea-charts called Portolani, the earliest being about 1300, and the first with date being of 1311. Even a cursory inspection of a Portolano would reveal two things, the accuracy of the delineation and the presence of a multiplicity of criss-cross lines. These spider webs, which should perhaps be interpreted as prototypes of the compass-roses of modern charts, proved beyond dispute that the Portolani were based upon compass-work, and raised the further question: who was responsible for the compass, without which the perfect sea-charts of the middle ages could not have been produced? Dante's tutor, Brunetto Latini, heard Roger Bacon lecture at Oxford in 1258 on the magnetized needle 'which would indicate the star'; and realizing what a boon it would be to mariners, dismissed it with the cynical comment that such a superstitious body of men would never be induced to use it. The perfection of the Portolani, however, indicated that they must be at least a century older than the earliest dated example, and therefore the compass must be older still. It was, in fact, mentioned by Alexander Neckham (1180) as a necessary part of every sailor's equipment. There would, indeed, be weight in the argument that a century was not a long enough interval for the perfection, distribution, and employment of charting reached in 1311. The origin of the compass might be still more remote, and possibly the Romans were acquainted with it. There were static and kinetic elements in the Portolani: the first involved contentment with such useful knowledge as was available before instruments such as the theodolite were invented; the second betrayed discontent with anything short of perfection. The Portuguese reached India by sea and pushed on with the making of charts till they covered the globe. The publication of Ptolemy's maps gave them a basis on which to build up scientific charts; and the acceptance of Ptolemy ruled out all the work done by the makers of *mappae mundi*; but the latter, as a picture of the medieval mind, were necessary for a full appreciation of the age, just as maps were indispensable in modern history.

Mr. Hinks expressed his indebtedness to Mr. Andrews for much instruction in a subject he had hitherto regarded as outside his own province, which was limited to maps based on latitude and longitude. He had derived much pleasure both from the paper and the subsequent discussion.

The President said the revelations made in the paper produced in him a certain degree of melancholy, to think that the ingenuity, imagination, and resource of a thousand years should have been superseded without leaving any impress on the geography of the present day. Such a collapse had not occurred in the arts or in religion. The medieval map-makers had no sense of obligation to their predecessors, and ignored all previous knowledge; but texts survived while knowledge slept, and the idea of sphericity never entirely disappeared. The Portolani were business maps, and the rest were fairy-tales: for instance, the place where the tides met came by degeneration to be represented by curls. Many details in the T maps were survivals imperfectly understood by copyists; and copies of Macrobius continued to be printed till the eighteenth century. Two examples, in the Morgan and Rylands Libraries, were produced within thirty or forty years, but differed fundamentally in their representation of the world: they belonged to an era of romance.

Mr. ANDREWS, in reply, expressed his appreciation of the privilege of bringing the subject before the Society. The paper was in an imperfect and condensed form, and he hoped to pursue the inquiry as Mr. Brindley had suggested, and examine various groups that had been barely mentioned. Any classification was difficult, but the one adopted was found to accommodate most of the examples known. He had not intended to cast doubts on the authenticity of the surviving versions of Ptolemy's geography.

ILLUSTRATIONS

THE illustrations are from full-sized photographs of the originals which are here reproduced for the first time.

Thanks are due to the authorities of the various libraries who have allowed these photographs to be taken.